Indiana Department of Natural Resources
Division of Forestry

-Draft-

Resource Management Guides

Owen-Putnam State Forest

30-day Public Comment Period: December 30, 2019 – January 28, 2020

The Indiana State Forest system consists of approximately 158,000 acres of primarily forested land. These lands are managed under the principle of multiple use-multiple benefit to provide forest conservation, goods and services for current and future generations. The management is guided by scientific principles, guiding legislation and comprehensive forest certification standards which are independently audited to help insure long term forest health, resiliency and sustainability.

For management and planning purposes each State Forest is divided into a system of compartments and tracts. In general terms compartments are 500-1,000 acres in size and their subunits (tracts) are 50-200 acres in size. Resource Management Guides (RMGs) are then developed for each tract to guide their management through a 15-25 year management period. There are approximately 1,700 tracts in the State Forest system. During annual planning efforts 50-100 tracts are reviewed and RMGs developed based on current conditions, inventories and assessments.

The RMGs listed below and contained in this document are part of this year's tracts under review for Clark State Forest.

Compartment 2 Tract 2
Compartment 8 Tract 3
Compartment 8 Tract 10
Compartment 9 Tract 7

To submit a comment on this document, go to:
www.in.gov/dnr/forestry/8122.htm

You must indicate the State Forest Name, Compartment number and Tract number in the "subject or file reference" line to ensure that your comment receives appropriate consideration. Comments received within 30 days of posting will be considered and review posted at http://www.in.gov/dnr/forestry/3634.htm.

Owen-Putnam State Forest **Tract:** 6380202 (Comp 2 Tract 2)
Forester: R. Duncan **Date:** December 2019
Tract Acreage: 80 **Forested Acreage:** 80
Management Cycle End Year: 2034 **Management Cycle Length:** 15

Location
Compartment 2, tract 2 is located in the eastern half of section 4, township 11N, range 4W, Jennings Township, Owen County. The tract is located off of Oak Road near the small town of Cataract.

General Description
This tract is an 80-acre, sustainably managed, multiple use parcel located within the 439 acres comprising compartment 2 of the Owen-Putnam State Forest. Timber types include closed canopy oak-hickory, beech-maple, mixed hardwoods and pine. Prior to state ownership, this tract was once part of a farm with nearly level terrain to the west with moderate to steep slopes moving east and southeast. The western edge of the tract was planted to eastern white pine (Pinus strobus), red pine (Pinus resinosa), and Virginia pine (Pinus virginiana) approximately 60 years ago to control erosion caused most likely by poor farming practices. The pine areas show some decline due to windthrow and overcrowding. The over-story consists of medium to large sawlog sized mixed hardwoods. The quality of merchantable timber is good. However, there is some decline in the poplar due to drought and insect stress. This area exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, hiking, gathering, viewing and interpretation.

History
Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Prior to state ownership, many of the ridge tops in the area were farmed through the 1930's. Sometime in the 1960's many of the severely eroded ridge tops were planted to pine to stabilize the soil. Compartment 2 tract 2 has been managed for many years.

- Timber harvest in 1981
- Property wide timber inventory (TIMPIS) in 1988
- Timber inventory in 2005
- Timber harvest in 2007
- Timber inventory in 2011
- Timber inventory in 2019

Landscape Context
Compartment 2 tract 2 is located in a rural area. Generally the area is forested hills and ravines with more open flat farmland to the northeast. The private properties adjacent to this compartment and tract are primarily closed canopy, deciduous, mixed hardwood forests with no industry, very little agriculture, some scattered rural and more concentrated residential housing, small fields/pastures and small ponds located primarily along county roads beyond the state forest.

Topography, Geology and Hydrology
This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Escarpment Section. This section includes the rugged hills situated along the eastern border of the region. It is a blend of the Crawford Upland Section and the Mitchel Karst Plain Section of the Highland Rim. Sandstone and sandstone derived soils (Wellston-Zanesville) cap most of the hills, and the lower elevations present limestone and limestone-derived soils. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.

The topography of the tract varies from nearly level ground on the ridge top along the west side of the tract to moderately steep east and south facing slopes. Water sheds into a perennial stream flowing northeast to southwest along the southern edge of the tract.

Soils
Generally the soils are composed of moderately deep to deep, moderately drained to well drained soils on moderately steep to steep slopes underlain with sandstone, siltstone and shale. In some areas the soils are underlain with till and sand. These soils occur throughout the Illinoian glaciated areas of the county. The soils are composed of a variety of types. The dominant soils are of the Hickory, Zanesville and Solsberry series. These soils occupy the slopes of which this tract is predominantly made. They can produce good timber with the other soils located in the tract often well suited to timber production. In the event of a harvest, the existing trail system and log yards will be utilized, eliminating the need for new trail construction and minimizing soil disturbance. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to preserve soil and water quality, including riparian management zones around specific water resources within this tract.

Specifically, this tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

HesG—Hickory-Chetwynd loams, 35 to 70 percent slopes, *Setting:* Dissected till plains, *Position:* Backslopes, *Site Index*: Upland oak 85

HeuF—Hickory-Wellston silt loams, 25 to 35 percent slopes, *Setting:* Dissected till plains over interbedded shale, siltstone, and sandstone, *Position:* Backslopes, *Site Index*: Upland oak 85

ZamD5 – Zanesville silt loam, soft bedrock substratum**,** 12 to 18 percent slopes, gullied, S*etting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Backslopes, *Site Index*: Upland oak 69-75

ZamC3—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and backslopes, *Site Index*: Upland oak 69-75

ZamB2—Zanesville silt loam, soft bedrock substratum, 2 to 6 percent slopes, eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and summits, *Site Index*: Upland oak 69-75

ZapD3—Zanesville, soft bedrock substratum-Tulip silt loams, 12 to 18 percent slopes, severely eroded, *Setting:* Hills underlain with interbedded sandstone, shale, and siltstone, *Position:* Backslopes, *Site Index*: Upland oak 69-75

SneC3—Solsberry silt loam, 6 to 12 percent slopes, severely eroded, *Setting:* Dissected till plains, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 80

PbbC2—Parke silt loam, 6 to 12 percent
slopes, eroded, *Setting:* Dissected outwash plains, *Position:* Shoulders and backslopes

OfcAV – Oldenburg fine sandy loam, sandy substratum, 0 to 2 percent slopes, frequently flooded, very brief duration, *Setting:* Flood plains, *Position:* Flood-plain steps, *Site Index*: Upland oak 85

Access
To access the tract from Spencer Indiana, travel north on U.S. 231 to South Cataract Road, travel west on South Cataract Road to Ponderosa Road, travel west on Ponderosa Road to Cunot Cataract Road, travel west on Cunot Cataract Road to Oak Road, travel west on Oak Road approximately one mile to the parking lot on the south side of Oak Road. There is a locked fire trail leading out of the parking into the tract. Management access as well as public recreational access to this tract is good.

Boundary
Private property borders this tract along the north, east and south sides with approximate boundary lines having been located and marked with orange paint and flagging. The boundary lines have been marked in the past. The remainder of the tract borders state forest.

Wildlife
With the presence of the upland and lowland forest areas, which includes oak-hickory, beech-maple, mixed hardwoods, pine, pockets of herbaceous plants, ephemeral drainages and a perennial stream, this tract contains habitat for a variety of wildlife species. Common species or sign observed include eastern gray squirrel (Sciurus carolinensis), eastern chipmunk (Tamias striatus), white-tailed deer (Odocoileus virginianus), wild turkey (Meleagris gallopavo), Virginia opossum (Didelphis virginiana), North American raccoon (Procyon lotor), Eastern box turtle (Terrapene carolina carolina), raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.

Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.

Live trees containing cavities provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).

Snags provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, streams and drainages provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands, streams and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (E. Hoyt 2019) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags $\geq$ 5" D.B.H. and $\geq$ 9" D.B.H. in this tract are above the maintenance levels for both classes. However, snags in the $\geq$ 19" D.B.H. class are below the maintenance level. The lack of large diameter snags is often attributable to the overall good health of the forest and the short retention of large standing dead trees. Snags can have short standing times and often become wind thrown.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees can be performed through post harvest

timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	720	1590	870
20"+ DBH	240	519	279
Snags (all species)			
5"+ DBH	320	1648	1328
9"+ DBH	240	424	184
19"+ DBH	40	37	-3

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower slopes, and some floodplain along drainages. The dry-mesic upland forest community has moderate soil moisture with trees growing well, however the canopy is usually more open than in mesic forests. It is one of the most prevalent forest communities in Indiana. It occurs on slopes throughout the state. The dominant plants in this community are the white oak (Quercus alba), northern red oak (Quercus rubra) and black oak (Quercus velutina). Characteristic plants in this community are the shagbark hickory (Carya ovata), mockernut hickory (Carya tomentosa), flowering dogwood (Cornus florida), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

Exotic/invasive species multi-flora rose (Rosa multiflora) and autumn olive **(**Elaeagnus umbellata) are present in and around this tract in patches of light to moderate densities. These species are commonly occurring throughout the county. Control measures can be undertaken during post-harvest timber stand improvement, to treat problem occurrences before their populations expand.

Recreation
While there are no recreation trails on this multiple use tract, it has good public access via the parking lot and access trail located on Oak Road. Hunting and gathering are considered the primary recreational uses of this tract.

Cultural
This tract was reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription
In 1981 compartment 2 tract 2 was marked for sale (B. Hahn, Property Manager, MMSF and Wayne Meek, Property Manager, OPSF) and harvested (Collier lumber) of ~132,115 Bd. Ft. in 606 trees on 82 acres (1611 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 1988 and 1989 a property wide timber inventory (TIMPIS) was conducted, including Compartment 2 tract 2. The data estimated the tract to be 70% stocked with 78 Sq. Ft. of total basal area per acre in 173 trees per acre, containing approximately 2,859 Bd. Ft. of total sawtimber per acre.

In 2005 a routine timber inventory was conducted (B. Gallogly, Property Manager, OPSF). The data estimated the tract to contain 158 Sq. Ft. of total basal area per acre with approximately 6,247 Bd. Ft. of total sawtimber per acre.

In 2007 the tract was marked for sale (B. Gallogly) and harvested (R. Booe & Son Hardwoods) of ~134,000 Bd. Ft. in 527 trees on 70 acres (1914 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2011 a routine timber inventory was conducted (R. Duncan, Resource Specialist, OPSF). The data estimated the tract to contain 135 Sq. Ft. of total basal area per acre in 240 trees per acre with approximately 8422 Bd. Ft. of total sawtimber per acre.

In 2019 a routine timber inventory was conducted (E. Hoyt, Forestry Intern). The data estimated the tract to be 85% stocked with 103 Sq. Ft. of total basal area per acre in 127 trees per acre containing approximately 10,763 Bd. Ft. of total sawtimber per acre.

Timber in compartment 2 tract 2 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, and small pine stands. The over-story consists mostly of medium to large sawlog sized poplar, oak, hickory, beech, maple, black cherry and black walnut; with eastern white pine, red pine, and Virginia pine comprising approximately 7 acres along the west side of the tract. The quality of merchantable timber is good with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The pole-sized under-story consists mostly of sassafras, maple, pine, beech, and poplar. Advanced regeneration is represented mostly by beech, maple, cherry, and poplar.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that resource competition is taking place and thinning may be beneficial. Often, there is little groundcover or early successional regeneration in these areas due to low light levels and browse. In the remaining areas, the tract is still maturing but could benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate harvest in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system.

A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Hardwood group selection openings, on less than 10% of the tract, may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration and early successional habitat.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

The long term objective with the pine stands is a transitioning over the next 2 cycles away from these non-native species and towards a native hardwood mix. This would utilize a combination of group and single tree selection systems as described above.

Management in the form of timber stand improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose and autumn olive.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide forest wildlife habitat. The overall prescribed harvest would remove approximately 25-33% of the standing volume, with an estimated volume: 215,000-285,000 board feet.

The tract is projected to remain in the fully stocked category after the prescribed elective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary

Total Number Trees/Acre: 127 **Average Tree Diameter:** 14.5”
Average Site Index: 80 Oak **Stocking Level:** 85%

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	73	**Basal Area Sawtimber.**	79.6
Pine Commercial Forest:	7	**Basal Area Poles:**	20.0
Noncommercial Forest:	0	**Basal Area Culls:**	1.6
Permanent Openings:	0	**Sub Merch.**	1.6
Other Use:			
Total:	80	**Total Basal Area:**	102.8

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

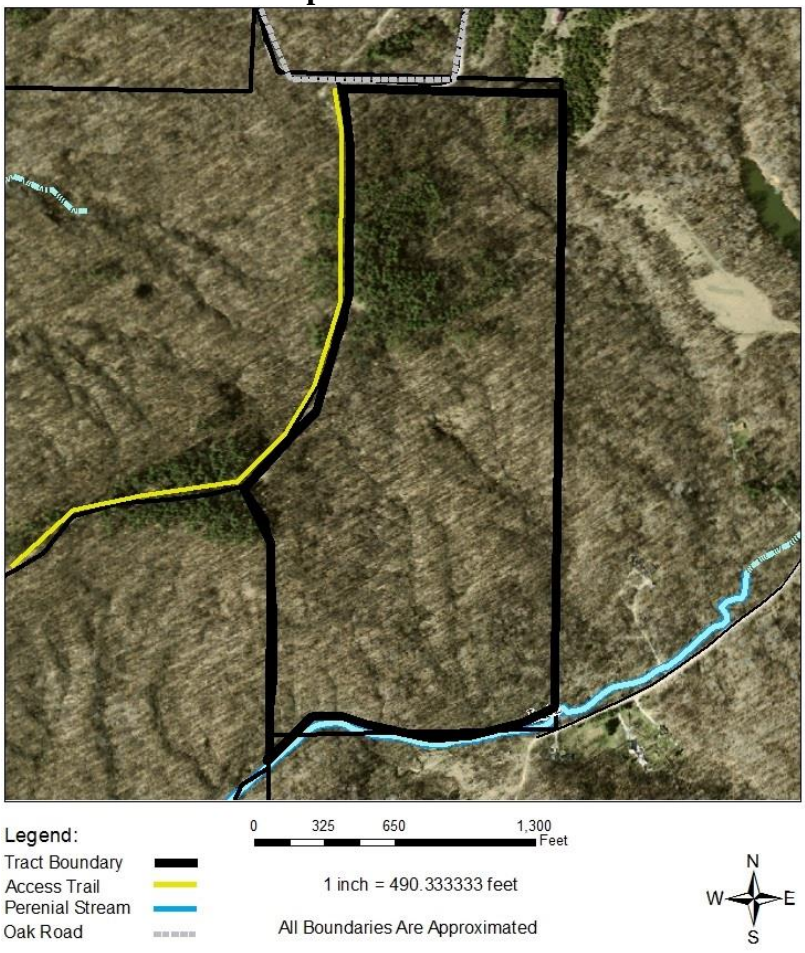
Tree Species	Total Volume Per Acre
Yellow-Poplar	3698
Red Oak	2909
White Oak	1096
E. White Pine	985
Sugar Maple	644
Black Walnut	350
Sassafras	291
Pignut Hickory	248
Black Cherry	134
Shagbark Hickory	114
Virginia Pine	107

American Beech	81
Red Maple	59
Largetooth Aspen	37
Red Pine	9
Total/Acre	10,762
Tract Total	861,054

Proposed Management Activities

2020----------	Address exotic/invasive species
2021-22 -------	Timber Marking and Sale Layout
2021-23 -------	Timber Sale/Harvest
2022-24 -------	Post-Harvest TSI and Exotic/Invasive Control
2024-2026-----	Regeneration Opening Review
2031-2033-----	Inventory

Compartment 2 Tract 2



Owen-Putnam State Forest | **Tract:** 6380803 (Comp 8 Tract 3)
Tract Acres: 66 | **Forested Acreage:** 66
Forester: R. Duncan | **Date:** December 2019
Management Cycle End Year: 2034 | **Management Cycle Length:** 15 years

Location

Compartment 8, tract 3 is located in the northeast quarter of section 34, township 11N, range 4W, Morgan Township, Owen County. Approximately 2.5 miles north of the Owen-Putnam State Forest office.

General Description

This tract is a 66-acre, sustainably managed, multiple use parcel located within the 767 acres comprising compartment 8 of the Owen-Putnam State Forest. Timber types include closed canopy oak-hickory, beech-maple, mixed hardwoods and pine. Prior to state ownership, this tract was once part of a farm with nearly level terrain along the ridgetop to the east with moderate to steep slopes moving west and southwest. The eastern edge of the tract was planted to eastern white pine (Pinus strobus), red pine (Pinus resinosa) and Virginia pine (Pinus virginiana) approximately 60 years ago to control erosion caused, most likely, by poor farming practices. The pine areas show some decline due to windthrow and overcrowding. The over-story consists of medium to large sawlog sized mixed hardwoods. The quality of merchantable timber is good. However, there is some decline in the poplar due to drought and insect stress. This area exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, hiking, gathering, viewing and interpretation.

History

Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Prior to state ownership, many of the ridge tops in the area were farmed through the 1930's. Sometime in the 1960's many of the severely eroded ridge tops were planted to pine to stabilize the soil. Compartment 8 tract 3 has been managed for many years.

- Timber harvest in 1979
- Property wide timber inventory (TIMPIS) in 1988
- Timber inventory in 2005
- Timber harvest in 2006
- Timber inventory in 2019

Landscape Context

Compartment 8 tract 3 is located in a rural area. Generally the area is forested hills and ravines. The private properties adjacent to this compartment and tract are primarily closed canopy, deciduous, mixed hardwood forests with no industry, very little agriculture, some scattered rural and more concentrated residential housing, small fields/pastures and small ponds located primarily along county roads beyond the state forest.

Topography, Geology and Hydrology
This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Escarpment Section. This section includes the rugged hills situated along the eastern border of the region. It is a blend of the Crawford Upland Section and the Mitchel Karst Plain Section of the Highland Rim. Sandstone and sandstone derived soils (Wellston-Zanesville) cap most of the hills, and the lower elevations present limestone and limestone-derived soils. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.

The topography of the tract varies from nearly level ground on the ridge top in the southwest section of the tract to moderately steep to steep east, west and south facing slopes. Water sheds into a mapped intermittent stream flowing north to south along the western edge of the tract, which flows into Fishcreek, a perennial stream located to the west. The Eel River Basin is located to the northwest and the West Fork of the White River Basin to the southeast.

Soils
Generally the soils in the area are composed of moderately deep to deep, moderately drained to well drained soils on moderately steep to steep slopes underlain with sandstone, siltstone and shale. In some areas the soils are underlain with till and sand. These soils occur throughout the Illinoian glaciated areas of the county. The soils are composed of a variety of types. The dominant soils are of the Hickory, Zanesville and Solsberry series. These soils occupy the slopes of which this tract is predominantly made. They can produce good timber with the other soils located in the tract often well suited to timber production. In the event of a harvest, the existing trail system and log yards will be utilized, eliminating the need for new trail construction and minimizing soil disturbance. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to preserve soil and water quality, including riparian management zones around specific water resources within this tract.

Specifically, this tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

TtaG—Tulip-Tipsaw complex, 25 to 60 percent slopes, *Setting:* Structural benches and scarps underlain with interbedded sandstone, shale, and siltstone, *Position:* Backslopes and footslopes, *Site Index*: Upland oak 80

ZamC2—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, eroded, *Setting:* Hills underlain with interbedded sandstone, shale, and siltstone, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 69-75

ZamC3—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and backslopes, *Site Index*: Upland oak 69-75

ZamB2—Zanesville silt loam, soft bedrock substratum, 2 to 6 percent slopes, eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and summits, *Site Index*: Upland oak 69-75

BdxAV—Belknap silt loam, 0 to 2 percent slopes, frequently flooded, very brief Duration *Setting:* Flood plains, *Position:* Flood-plain steps, *Site Index*: Upland oak 69-75

HeuF—Hickory-Wellston silt loams, 25 to 35 percent slopes, *Setting:* Dissected till plains over interbedded shale, siltstone, and sandstone, *Position:* Backslopes, *Site Index*: Upland oak 85
HepG—Hickory-Adyeville complex, 35 to 60 percent slopes, *Setting*: Dissected till plains over interbedded shale, siltstone, and sandstone, *Position*: Backslopes, *Site Index*: Upland oak 85

CkkB2—Cincinnati silt loam, 2 to 6 percent slopes, eroded, *Setting*: Dissected till plains, *Position:* Summits and shoulders, *Site Index*: Upland oak 80

SneD5—Solsberry silt loam, 12 to 18 percent slopes, gullied *Setting:* Dissected till plains
Position: Backslopes *Site Index*: Upland oak 80

SneD3—Solsberry silt loam, 12 to 18 percent slopes, severely eroded, *Setting:* Dissected till plains, *Position:* Backslopes, *Site Index*: Upland oak 80

Access
To access the tract from Spencer Indiana, travel west on State Road 46 approximately 5-miles to Fishcreek Road, travel north on Fishcreek Road approximately 2-miles to Weilhammer Road, travel east on Weilhammer Road approximately ¾ of a mile to Powell Red Bud Lane, travel south on Powell Red Bud Lane about a ¼ mile to the forest parking lot and access road. There is a locked fire trail leading out of the parking into the tract. The tract is accessible to the public via the parking lot on Powell Red Bud Lane. Management access as well as public recreational access to this tract is relatively good.

Boundary
Private property borders this tract along the north side with approximate boundary lines having been located and marked with orange paint and flagging. The boundary line has been documented and maintained in the past. The remainder of the tract borders state forest.

Wildlife
With the presence of the upland and lowland forest areas, which includes oak-hickory, beech-maple, mixed hardwoods, pine, pockets of herbaceous plants, ephemeral drainages and a mapped intermittent stream, this tract contains habitat for a variety of wildlife species. Common species or sign observed include eastern gray squirrel (Sciurus carolinensis), eastern chipmunk (Tamias striatus), white-tailed deer (Odocoileus virginianus), wild turkey (Meleagris gallopavo), Virginia opossum (Didelphis virginiana), North American raccoon (Procyon lotor), Eastern box turtle (Terrapene carolina carolina), raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.

Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.
Live trees containing cavities provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).

Snags provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, streams and drainages provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands, streams and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (E. Hoyt 2019) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags $\geq$ 5" D.B.H. and $\geq$ 9" D.B.H. in this tract are above the maintenance levels for both classes. However, snags in the $\geq$ 19" D.B.H. class are below the maintenance level. The lack of large diameter snags is often attributable to the overall good health of the forest and the short retention of large standing dead trees. Snags can have short standing times and often become wind thrown.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees can be performed through post harvest timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	594	2141	1547
20"+ DBH	198	527	329
Snags (all species)			
5"+ DBH	264	281	17
9"+ DBH	198	281	83
19"+ DBH	33	27	-6

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower slopes, and some floodplain along drainages. The dry-mesic upland forest community has moderate soil moisture with trees growing well, however the canopy is usually more open than in mesic forests. It is one of the most prevalent forest communities in Indiana. It occurs on slopes throughout the state. The dominant plants in this community are the white oak (Quercus alba), northern red oak (Quercus rubra) and black oak (Quercus velutina). Characteristic plants in this community are the shagbark hickory (Carya ovata), mockernut hickory (Carya tomentosa), flowering dogwood (Cornus florida), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

Exotic/invasive species multi-flora rose (Rosa multiflora) and autumn olive **(**Elaeagnus umbellata) are present in and around this tract in patches of light to moderate densities. These species are

commonly occurring throughout the county. Control measures can be undertaken during post-harvest timber stand improvement, to treat problem occurrences before their populations expand.

Recreation
While there are no recreation trails on this multiple use tract, it has good public access via the parking lot and access trail located on Powell Redbud Lane. Hunting and gathering are considered the primary recreational uses of this tract.

Cultural
This tract was reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription
In 1979 compartment 8 tract 3, formerly compartment 10 tract 2, was marked for sale (B. Hahn, Property Manager, MMSF) and harvested (Barnett Lumber, Co.) of ~89,000 Bd. Ft. in 404 trees on 109 acres (816 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 1988 and 1989 a property wide timber inventory (TIMPIS) was conducted, including Compartment 8 tract 3. The data estimated the tract to be 66% stocked with 77 Sq. Ft. of total basal area per acre in 122 trees per acre, containing approximately 4945 Bd. Ft. of total sawtimber per acre.

In 2005 a routine timber inventory was conducted (R. Duncan, Resource Specialist, OPSF). The data estimated the tract to contain 119 Sq. Ft. of total basal area per acre in 512 trees per acre with approximately 9085 Bd. Ft. of total sawtimber per acre.

In 2006 the tract was marked for sale (B. Gallogly, Property Manager, OPSF) and harvested (R. Booe & Son Hardwoods) of ~187,500 Bd. Ft. in 645 trees on 66 acres (2840 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2019 a routine timber inventory was conducted (E. Hoyt, Forestry Intern). The data estimated the tract to be 85% stocked with 108 Sq. Ft. of total basal area per acre in 125 trees per acre containing approximately 10,662 Bd. Ft. of total sawtimber per acre.

Timber in compartment 8 tract 3 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, beech-maple and small pine stands. The over-story consists mostly of medium to large sawlog sized maple, poplar, oak, beech, and hickory; with eastern white pine, red pine, and Virginia pine along the east side of the tract. The quality of merchantable timber is good with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The pole-sized under-story consists mostly of beech, maple, poplar, basswood, sassafras and hickory. Advanced regeneration is represented mostly by beech, maple, sassafras and hickory.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that resource competition is taking place and thinning may be beneficial. Often, there is little groundcover or early successional regeneration in these areas due to low light levels and browse. In the remaining areas, the tract is still maturing but could benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate harvest in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system.

A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Hardwood group selection openings, on less than 10% of the tract may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration and early successional habitat.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

Management in the form of timber stand improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose and autumn olive.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide forest wildlife habitat. The overall prescribed harvest would remove approximately 25-33% of the standing volume, with an estimated volume: 175,000-233,000 board feet.
The tract is projected to remain in the fully stocked category after the prescribed elective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary

Total Number Trees/Acre: 125 **Average Tree Diameter:** 14.5"
Average Site Index: 80 Oak **Stocking Level:** 85%

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	66	**Basal Area Sawtimber.**	83.2
Pine Commercial Forest:	0	**Basal Area Poles:**	20.4
Noncommercial Forest:	0	**Basal Area Culls:**	2.9
Permanent Openings:	0	**Sub Merch.**	1.4
Other Use:			
Total:	66	**Total Basal Area:**	107.9

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

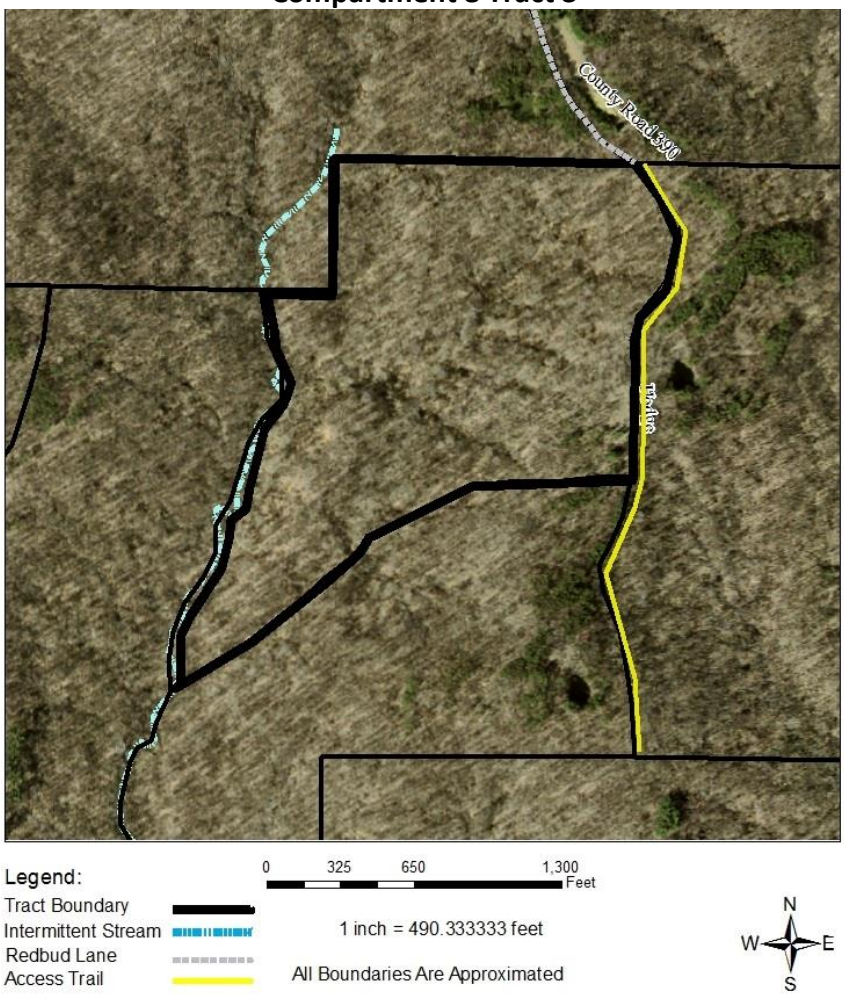
Tree Species	Total Volume Per Acre
Sugar Maple	2682
Yellow-Poplar	2661
White Oak	1306
Red Oak	1304
American Beech	678
Shagbark Hickory	638
Pignut Hickory	556
Red Maple	265
Black Walnut	149
Sassafras	140
Largetooth Aspen	92
Black Oak	49
White Ash	48
American Sycamore	43

Virginia Pine	28
Black Cherry	23
Total/Acre	10,662
Tract Total	703,733

Proposed Management Activities

2020 ----------	Address exotic/invasive species
2021-22 -------	Timber Marking and Sale Layout
2021-23 -------	Timber Sale/Harvest
2022-24 -------	Post-Harvest TSI and Exotic/Invasive Control
2024-2026-----	Regeneration Opening Review
2031-2033-----	Inventory

Compartment 8 Tract 3



Owen-Putnam State Forest | **Tract:** 6380810 (Comp 8 Tract 10)
Tract Acres: 52 | **Forested Acreage:** 52
Forester: R. Duncan | **Date:** December 2019
Management Cycle End Year: 2034 | **Management Cycle Length:** 15 years

Location

Compartment 8, tract 10 is located in the southeast quarter of section 3, township 10N, range 4W, Morgan Township, Owen County. The tract is located off of Moore road.

General Description

This tract is a 52-acre, sustainably managed, multiple use parcel located within the 767 acres comprising compartment 8 of the Owen-Putnam State Forest. Timber types include closed canopy oak-hickory, beech-maple, mixed hardwoods and pine. Prior to state ownership, this tract was most likely part of a farm with nearly level terrain along the ridgetop to the north with moderate to steep slopes moving south to southwest. The northern and eastern edges of the tract were planted to eastern white pine (Pinus strobus), red pine (Pinus resinosa) and Virginia pine (Pinus virginiana) approximately 60 years ago to control erosion, most likely, caused by poor farming practices. The pine areas show some decline due to windthrow and overcrowding. The over-story consists of medium to large sawlog sized mixed hardwoods. The quality of merchantable timber is good. However, there is some decline in the poplar due to drought and insect stress. This area exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, hiking, gathering, viewing and interpretation.

History

Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Prior to state ownership, many of the ridge tops in the area were farmed through the 1930's. Sometime in the 1960's many of the severely eroded ridge tops were planted to pine to stabilize the soil. Compartment 8 tract 10 has been managed for many years.

- Property wide timber inventory (TIMPIS) in 1988
- Timber inventory in 2003
- Resource management guide 2004
- Timber harvest in 2006
- Timber inventory in 2019

Landscape Context

Compartment 8 tract 10 is located in a rural area. Generally the area is forested hills and ravines. The private properties adjacent to this compartment and tract are primarily closed canopy, deciduous, mixed hardwood forests with no industry, very little agriculture, some scattered rural and more concentrated residential housing, small fields/pastures and small ponds located primarily along county roads beyond the state forest.

Topography, Geology and Hydrology
This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Escarpment Section. This section includes the rugged hills situated along the eastern border of the region. It is a blend of the Crawford Upland Section and the Mitchel Karst Plain Section of the Highland Rim. Sandstone and sandstone derived soils (Wellston-Zanesville) cap most of the hills, and the lower elevations present limestone and limestone-derived soils. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.

The topography of the tract varies from nearly level ground on the ridge top to the north with moderate to steep south and southwest facing slopes. Water sheds west through ephemeral drainages into a perennial stream (Fishcreek) which flows from north to south near the western edge of the tract. The Eel River Basin is located to the northwest and the West Fork of the White River Basin to the southeast.

Soils
Generally the soils in the area are composed of moderately deep to deep, moderately drained to well drained soils on moderately steep to steep slopes underlain with sandstone, siltstone and shale. In some areas the soils are underlain with till and sand. These soils occur throughout the Illinoian glaciated areas of the county. The soils are composed of a variety of types. The dominant soils are of the Zanesville and Tulip series. These soils occupy the slopes of which this tract is predominantly made. They can produce good timber with the other soils located in the tract often well suited to timber production. In the event of a harvest, the existing trail system and log yards will be utilized, eliminating the need for new trail construction and minimizing soil disturbance. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to preserve soil and water quality, including riparian management zones around specific water resources within this tract.

Specifically, this tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

ZamC2—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, eroded, *Setting:* Hills underlain with interbedded sandstone, shale, and siltstone, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 69-75

ZamC3—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and backslopes, *Site Index*: Upland oak 69-75

ZapD3—Zanesville, soft bedrock substratum-Tulip silt loams, 12 to 18 percent slopes, severely eroded, *Setting:* Hills underlain with interbedded sandstone, shale, and siltstone, *Position:* Backslopes, *Site Index*: Upland oak 69-75

ZamD5 – Zanesville silt loam, soft bedrock substratum, 12 to 18 percent slopes, gullied, S*etting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Backslopes, *Site Index*: Upland oak 69-75

TtcE—Tulip-Wellston-Adyeville silt loams, 18 to 25 percent slopes, *Setting*: Structural benches and scarps underlain with interbedded sandstone, shale, and siltstone, *Position*: Backslopes and footslopes, *Site Index*: Upland oak 80

TtaG—Tulip-Tipsaw complex, 25 to 60 percent slopes, *Setting:* Structural benches and scarps underlain with interbedded sandstone, shale, and siltstone, *Position:* Backslopes and footslopes, *Site Index*: Upland oak 80

HepG—Hickory-Adyeville complex, 35 to 60 percent slopes, *Setting*: Dissected till plains over interbedded shale, siltstone, and sandstone, *Position*: Backslopes, *Site Index*: Upland oak 85

PryB—Potawatomi silt loam, 1 to 3 percent slopes, *Setting:* Hills underlain with interbedded, sandstone, shale, and siltstone, *Position:* Summits, *Site Index*: Upland oak 80

Access
To access the tract from Spencer Indiana, travel west on State Road 46 approximately 1-mile to Rattlesnake Road, travel north on Rattlesnake Road approximately 2.5-miles to Moore Road, travel west on Moore Road approximately 1/2 mile to the forest parking lot. The tract is accessible to the public via the parking lot on Moore Road. There is a locked fire trail leading out of the parking into the tract. Management access as well as public recreational access to this tract is good.

Boundary
Private property borders this tract along the east side with approximate boundary lines having been located and marked with orange paint and flagging. The boundary line has been documented and maintained in the past. The remainder of the tract borders state forest.

Wildlife
With the presence of the upland and lowland forest areas, which includes oak-hickory, beech-maple, mixed hardwoods, pine, pockets of herbaceous plants, ephemeral drainages, and a wildlife pond, this tract contains habitat for a variety of wildlife species. Common species or sign observed include eastern gray squirrel (Sciurus carolinensis), eastern chipmunk (Tamias striatus), white-tailed deer (Odocoileus virginianus), wild turkey (Meleagris gallopavo), Virginia opossum (Didelphis virginiana), North American raccoon (Procyon lotor), Eastern box turtle (Terrapene carolina carolina), raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.

Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.

Live trees containing cavities provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).

Snags provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, streams and drainages provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands, streams and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (E. Hoyt 2019) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags in this tract, as inventoried, are above the maintenance levels for all size classes.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees can be performed through post harvest timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	468	902	434
20"+ DBH	156	193	37
Snags (all species)			
5"+ DBH	208	600	392
9"+ DBH	156	383	227
19"+ DBH	26	32	6

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower slopes, and some floodplain along drainages. The dry-mesic upland forest community has moderate soil moisture with trees growing well, however the canopy is usually more open than in mesic forests. It is one of the most prevalent forest communities in Indiana. It occurs on slopes throughout the state. The dominant plants in this community are the white oak (Quercus alba), northern red oak (Quercus rubra) and black oak (Quercus velutina). Characteristic plants in this community are the shagbark hickory (Carya ovata), mockernut hickory (Carya tomentosa), flowering dogwood (Cornus florida), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

Exotic/invasive species multi-flora rose (Rosa multiflora) and autumn olive **(**Elaeagnus umbellata) are present in and around this tract in patches of light to moderate densities. These species are commonly occurring throughout the county. Control measures can be undertaken during post-harvest timber stand improvement, to treat problem occurrences before their populations expand.

Recreation

While there are no recreation trails on this multiple use tract, it has good public access via the parking lot and access trail located on Moore Road. Hunting and gathering are considered the primary recreational uses of this tract.

Cultural
This tract was reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription
In 1988 and 1989 a property wide timber inventory (TIMPIS) was conducted, including Compartment 8 tract 10. The data estimated the tract to be 69% stocked with 79 Sq. Ft. of total basal area per acre in 142 trees per acre containing approximately 3365 Bd. Ft. of total sawtimber per acre.

In 2003 a routine timber inventory was conducted (R. Duncan, Resource Specialist, OPSF). The data estimated the tract to be 100% stocked with 118 Sq. Ft. of total basal area per acre in 187 trees per acre containing approximately 6462 Bd. Ft. of total sawtimber per acre.

In 2006 the tract was marked for sale (R. Duncan) and harvested (R. Booe & Son Hardwoods) of ~110,600 Bd. Ft. in 553 trees on 52 acres (2126 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2019 a routine timber inventory was conducted (E. Hoyt, Forestry Intern). The data estimated the tract to be 88% stocked with 108 Sq. Ft. of total basal area per acre in 142 trees per acre containing approximately 10,480 Bd. Ft. of total sawtimber per acre.

Timber in compartment 8 tract 10 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, beech-maple and small pine stands. The over-story consists mostly of medium to large sawlog sized poplar, oak, maple, hickory and beech; with eastern white pine, red pine, and Virginia pine in the northern and central portion of the tract. The quality of merchantable timber is good with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The pole-sized under-story consists mostly of maple, basswood, beech, pine and hickory. Advanced regeneration is represented mostly by beech, maple, hickory and pawpaw.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that resource competition is taking place and thinning may be beneficial. Often, there is little groundcover or early successional regeneration in these areas due to low light levels and browse. In the remaining areas, the tract is still maturing but could benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate harvest in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system.

A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly

formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Hardwood group selection openings, on less than 10% of the tract may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration and early successional habitat.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

The long term objective with the pine stands is a transitioning over the next 2 cycles away from these non-native species and towards a native hardwood mix. This would utilize a combination of group and single tree selection systems as described above.

Management in the form of timber stand improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose and autumn olive.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide forest wildlife habitat. The overall prescribed harvest would remove approximately 25-33% of the standing volume, with an estimated volume: 136,000-180,000 board feet.

The tract is projected to remain in the fully stocked category after the prescribed elective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary

Total Number Trees/Acre: 142 **Average Tree Diameter:** 13.5"
Average Site Index: 75 Oak **Stocking Level:** 88%

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	44	**Basal Area Sawtimber.**	79.3
Pine Commercial Forest:	8	**Basal Area Poles:**	21.8
Noncommercial Forest:	0	**Basal Area Culls:**	5.4
Permanent Openings:	0	**Sub Merch.**	1.9
Other Use:			
Total:	52	**Total Basal Area:**	108.4

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

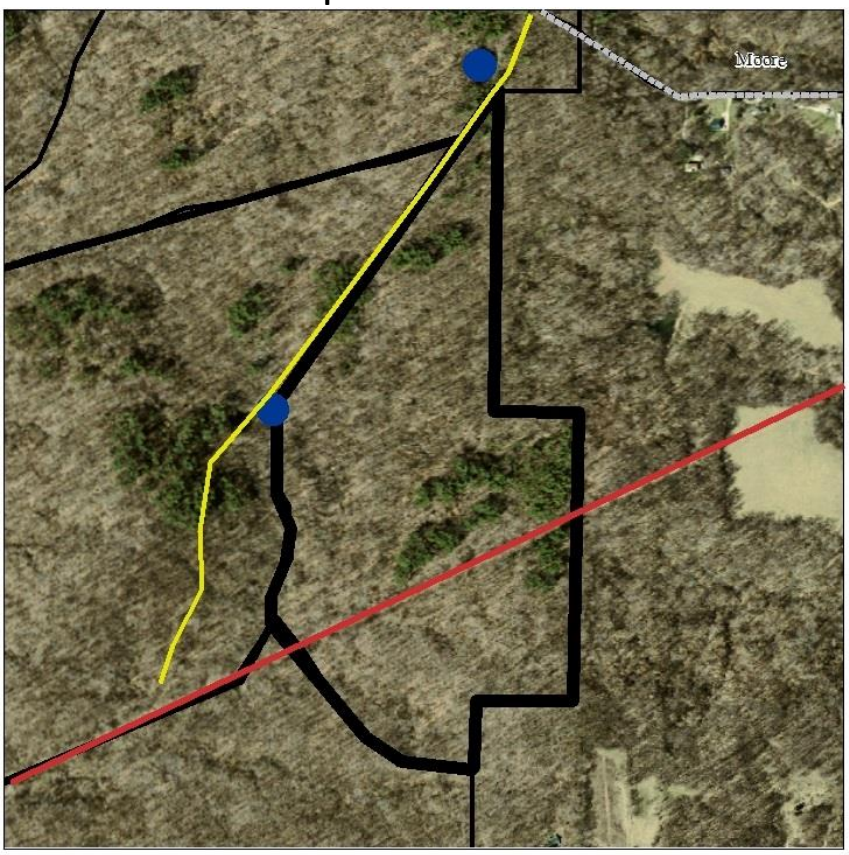
Tree Species	Total Volume Per Acre
Yellow-Poplar	3213
E. White Pine	2005
Sugar Maple	1439
Red Oak	697
Shagbark Hickory	362
White Oak	339
Sassafras	314
Pignut Hickory	302
American Beech	253
American Sycamore	212
Virginia Pine	190
Black Walnut	184
Black Cherry	189
Red Maple	176
Bitternut Hickory	170
Osage-Orange	107
Chinkapin Oak	101
E. Redcedar	89
Basswood	60
Pitch Pine	51

Red Pine	28
Total/Acre	10,480
Tract Total	544,943

Proposed Management Activities

2020 ----------	Address exotic/invasive species
2021-22 -------	Timber Marking and Sale Layout
2021-23 -------	Timber Sale/Harvest
2022-24 -------	Post-Harvest TSI and Exotic/Invasive Control
2024-2026-----	Regeneration Opening Review
2031-2033-----	Inventory

Compartment 8 Tract 10



Owen-Putnam State Forest | **Tract:** 6380907 (Comp 9 Tract 7)
Tract Acres: 78 | **Forested Acreage:** 78
Forester: R. Duncan | **Date:** December 2019
Management Cycle End Year: 2034 | **Management Cycle Length:** 15 years

Location

Compartment 9, tract 7 is located in the northeast quarter of section 9, township 10N, range 4W, Lafayette Township, Owen County. The tract is located off of Fishcreek road to the east and Mangus road to the west.

General Description

This tract is a 78-acre, sustainably managed, multiple use parcel located within the 838 acres comprising compartment 9 of the Owen-Putnam State Forest. Timber types include closed canopy oak-hickory, beech-maple, mixed hardwoods and pine. Prior to state ownership, this tract was most likely part of a farm with nearly level terrain along the ridgetop to the east with moderate slopes moving west to southwest. The northern and eastern edges of the tract were planted to eastern white pine (Pinus strobus), red pine (Pinus resinosa) and Virginia pine (Pinus virginiana) approximately 60 years ago to control erosion, most likely, caused by poor farming practices. The pine areas show some decline due to windthrow and overcrowding. The over-story consists of medium to large sawlog sized mixed hardwoods. The quality of merchantable timber is good. However, there is some decline in the poplar due to drought and insect stress. There is a small wildlife pond in the east-central portion of the tract that was created for wildlife habitat, and to capture natural runoff. This tract exhibits good opportunities for multiple use management, including timber management, wildlife management, soil and water conservation and public recreational activities, such as, hunting, hiking, gathering, viewing and interpretation.

History

Owen-Putnam State Forest was established in 1948 with most of its landholdings purchased as smaller non-contiguous tracts in the 50's and 60's. Prior to state ownership, many of the ridge tops in the area were farmed through the 1930's. Sometime in the 1960's many of the severely eroded ridge tops were planted to pine to stabilize the soil. Compartment 9 tract 7 has been managed for many years.

- Timber harvest in 1976
- Property wide timber inventory (TIMPIS) in 1988
- Timber inventory in 2004
- Resource management guide 2005
- Timber harvest in 2006
- Timber inventory in 2019

Landscape Context

Compartment 9 tract 7 is located in a rural area. Generally the area is forested hills and ravines. The private properties adjacent to this compartment and tract are primarily closed canopy, deciduous, mixed hardwood forests with no industry, very little agriculture, some scattered rural and more concentrated residential housing, small fields/pastures and small ponds located primarily along county roads beyond the state forest.

Topography, Geology and Hydrology
This part of Owen-Putnam State Forest falls in the Shawnee Hills Natural Region, Escarpment Section. This section includes the rugged hills situated along the eastern border of the region. It is a blend of the Crawford Upland Section and the Mitchel Karst Plain Section of the Highland Rim. Sandstone and sandstone derived soils (Wellston-Zanesville) cap most of the hills, and the lower elevations present limestone and limestone-derived soils. The upper slopes consist of an oak-hickory assortment, with a more mesic component in the coves resembling the mixed mesophytic forest community.

The topography of the tract varies from nearly level ground on the ridge top to the east with moderate to steep west and southwest facing slopes. Water sheds west and south through ephemeral drainages into an unmapped intermittent stream that flows south into a perennial stream along Mangus road. There is a small manmade pond in the east-central area of the tract. The Eel River Basin is located to the northwest and the West Fork of the White River Basin to the southeast.

Soils
Generally the soils in the area are composed of moderately deep to deep, moderately drained to well drained soils on moderately steep to steep slopes underlain with sandstone, siltstone and shale. In some areas the soils are underlain with till and sand. These soils occur throughout the Illinoian glaciated areas of the county. The soils are composed of a variety of types. The dominant soils are of the Zanesville and Tulip series. These soils occupy the slopes of which this tract is predominantly made. They can produce good timber with the other soils located in the tract often well suited to timber production. In the event of a harvest, the existing trail system and log yards will be utilized, eliminating the need for new trail construction and minimizing soil disturbance. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to preserve soil and water quality, including riparian management zones around specific water resources within this tract.

Specifically, this tract is composed of the following soils: (USDA, NRCS – Soil Survey, Owen County, IN 2005).

TtaG—Tulip-Tipsaw complex, 25 to 60 percent slopes, *Setting:* Structural benches and scarps underlain with interbedded sandstone, shale, and siltstone, *Position:* Backslopes and footslopes, *Site Index*: Upland oak 80

ZamC2—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, eroded, *Setting:* Hills underlain with interbedded sandstone, shale, and siltstone, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 69-75

ZamC3—Zanesville silt loam, soft bedrock substratum, 6 to 12 percent slopes, severely eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and backslopes, *Site Index*: Upland oak 69-75

ZamB2—Zanesville silt loam, soft bedrock substratum, 2 to 6 percent slopes, eroded, *Setting*: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Shoulders and summits, *Site Index*: Upland oak 69-75

ZamD2—Zanesville silt loam, soft bedrock substratum, 12 to 18 percent slopes, eroded
Setting: Hills underlain with interbedded sandstone, shale, and siltstone, *Position*: Backslopes, *Site Index*: Upland oak 69-75

SneC2—Solsberry silt loam, 6 to 12 percent slopes, eroded, S*etting:* Dissected till plains, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 80

SneC3—Solsberry silt loam, 6 to 12 percent slopes, severely eroded, *Setting:* Dissected till plains, *Position:* Shoulders and Backslopes, *Site Index*: Upland oak 80

HeuE—Hickory-Wellston silt loams, 18 to 25 percent slopes, *Setting*: Dissected till plains over interbedded shale, siltstone, and sandstone, *Position*: Backslopes, *Site Index*: Upland oak 85

CkkB2—Cincinnati silt loam, 2 to 6 percent slopes, eroded, *Setting*: Dissected till plains, *Position:* Summits and shoulders, *Site Index*: Upland oak 80

AloB2—Ava silt loam, 2 to 6 percent slopes, eroded, *Setting:* Dissected till plains, *Position:* Shoulders and summits, *Site Index*: Upland oak 75-80

BdxAV—Belknap silt loam, 0 to 2 percent slopes, frequently flooded, very brief Duration *Setting:* Flood plains, *Position:* Flood-plain steps, *Site Index*: Upland oak 69-75

Access
To access the tract from Spencer Indiana, travel west on State Road 46 approximately 5-miles to Fishcreek road, travel north on Fishcreek road approximately 0.75-mile to the forest office driveway, follow the driveway up the hill into Fishcreek campground, at the back of the campground is a metal farm gate. From the metal gate, there is a locked fire trail leading out of the campground into the tract. Management access as well as public recreational access to this tract is good.

Boundary
Private property borders this tract along the south and west sides with approximate boundary lines having been located and marked with orange paint and flagging. The boundary line has been documented and maintained in the past. The remainder of the tract borders state forest.

Wildlife
With the presence of the upland and lowland forest areas, which includes oak-hickory, beech-maple, mixed hardwoods, pine, pockets of herbaceous plants, ephemeral drainages, wildlife pond and perennial stream this tract contains habitat for a variety of wildlife species. Common species or sign observed include eastern gray squirrel (Sciurus carolinensis), eastern chipmunk (Tamias striatus), white-tailed deer (Odocoileus virginianus), wild turkey (Meleagris gallopavo), Virginia opossum (Didelphis virginiana), North American raccoon (Procyon lotor), Eastern box turtle

(Terrapene carolina carolina), raptors, songbirds, woodpeckers, toads, frogs and various small stream aquatic life.
Live trees in this tract provide for shelter, escape cover, roosting and as a direct (e.g. mast, foliage) or indirect (e.g. foraging substrate, bugging) food resource, with the oaks, hickories, walnuts and beech providing hard mast for deer, turkey and squirrel and the cherries providing soft mast for birds. The pine stands provide benefits such as cover, roosts and browse.
Live trees containing cavities provide nesting and denning opportunities for woodpeckers, songbirds and small mammals and potentially contribute to future snags (standing dead trees).

Snags provide essential habitat characteristics for foraging activity, nest/den sites, decomposers (e.g., fungi and invertebrates), bird perching and bat roosting, and are important contributors to the future pool of downed woody material.

Rotten logs, crater knolls, streams and drainages provide habitat for herptiles and aquatic vertebrates.

A Natural Heritage Database Review is part of the management planning process. If Rare, Threatened or Endangered species were identified for this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species.

The proposed management activities for this tract should not significantly alter the relative proportion and availability of habitat/cover types or significantly disrupt travel/dispersal corridors or create isolated habitat units separated from larger units of similar habitat. Nor should the proposed management activities increase the likelihood that specialist interior forest species would be affected by generalist species using forest edge habitats. Indiana Logging and Forestry Best Management Practices (B.M.P.s) will be followed to conserve soil and water resources and related forest wildlife habitats, such as springs/seeps, ponds/wetlands, streams and karst features.

Wildlife Habitat Features

According to the data collected during the tract inventory (E. Hoyt 2019) and represented in the following table, this tract is well represented with habitat in regards to the density, size and species of live and dead trees essential for consideration of various wildlife habitat needs including habitat specialists such as cavity nesters and species of conservation need like the Indiana bat (Mytolis sodalis) and their suggested habitat requirements.

Legacy trees, as defined by the Management Guidelines for Compartment-Level Wildlife Habitat Features are well represented above the suggested maintenance levels. White oak and shagbark hickory are two species having preferred characteristics for tree roosting bats. Both are relatively abundant in this tract and will be given consideration as habitat. Also, as the tract continues to mature, the number of legacy trees $\geq$ 20" D.B.H. is expected to rise.

Standing dead or dying trees (snags) are well represented in this tract. Snags $\geq$ 5" D.B.H. and $\geq$ 9" D.B.H. in this tract are above the maintenance levels for both classes. However, snags in the $\geq$ 19" D.B.H. class are below the maintenance level. The lack of large diameter snags is often attributable to the overall good health of the forest and the short retention of large standing dead trees. Snags can have short standing times and often become wind thrown.

Legacy trees, snags and cavity trees will be given consideration for retention as habitat for the Indiana bat and other wildlife as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property and the Management Guidelines for Compartment-Level Wildlife Habitat Features. In addition, the girdling of select cull trees can be performed through post-harvest timber stand improvement (T.S.I.) to address large diameter snag limitations. It should be noted these are compartment level guidelines and the target snag levels may well be present on the landscape.

Wildlife Habitat Feature Tract Summary

	Maintenance Level	Inventory	Available Above Maintenance
Legacy Trees *			
11"+ DBH	702	1598	434
20"+ DBH	234	463	37
Snags (all species)			
5"+ DBH	312	747	435
9"+ DBH	234	414	180
19"+ DBH	39	14	-25

*** Species Include:** AME, BIH, BLL, COT, GRA, REO, POO, REE, SHH, ZSH, SIM, SUM, WHA, WHO

Communities

Most of this tract is of the dry-mesic upland forest community type, with some isolated more mesic sites located along lower slopes, and some floodplain along drainages. The dry-mesic upland forest community has moderate soil moisture with trees growing well, however the canopy is usually more open than in mesic forests. It is one of the most prevalent forest communities in Indiana. It occurs on slopes throughout the state. The dominant plants in this community are the white oak (Quercus alba), northern red oak (Quercus rubra) and black oak (Quercus velutina). Characteristic plants in this community are the shagbark hickory (Carya ovata), mockernut hickory (Carya tomentosa), flowering dogwood (Cornus florida), hop hornbeam (Ostrya virginiana) and black haw (Viburnum prunifolium). Characteristic animals in this community are the broad-headed skink (Eumeces laticeps), white-footed mouse (Peromyscus leucopus) and eastern chipmunk (Tamias striatus).

Exotic/invasive species multi-flora rose (Rosa multiflora) and autumn olive **(**Elaeagnus umbellata) are present in and around this tract in patches of light to moderate densities. These species are

commonly occurring throughout the county. Control measures can be undertaken during post-harvest timber stand improvement, to treat problem occurrences before their populations expand.

Recreation
There are no recreational trails within the tract, however the tract is located west of the Fishcreek Campground. Poplar Top Trail, a shared property management access road and hiking trail, provides access to the tract as it treks along the tracts eastern boundary.

Cultural
This tract was reviewed for cultural sites during the forest resource inventory and planning process. Cultural resources may be present but their location(s) are protected. Adverse impacts to significant cultural resources noted will be avoided during management or construction activities.

Tract Description and Silvicultural Prescription
In 1976 a portion of compartment 9 tract 7, formerly compartment 11 tract 3, was marked for sale (J. Akard) and harvested (Crone Lumber Co.) of ~43,920 Bd. Ft. in 461 trees on 33 acres (1331 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 1988 and 1989 a property wide timber inventory (TIMPIS) was conducted, including Compartment 9 tract 7. The data estimated the tract to be 80% stocked with 93 Sq. Ft. of total basal area per acre in 168 trees per acre containing approximately 3856 Bd. Ft. of total sawtimber per acre.

In 2004 a routine timber inventory was conducted (R. Duncan, Resource Specialist, OPSF). The data estimated the tract to be 80% stocked with 97 Sq. Ft. of total basal area per acre in 125 trees per acre containing approximately 6057 Bd. Ft. of total sawtimber per acre.

In 2006 a larger version of the tract was marked for sale (R. Duncan) and harvested (R. Booe & Son Hardwoods) of ~175,200 Bd. Ft. in 997 trees on 124 acres (1412 Bd. Ft. /acre) as part of an intermediate harvest in the form of a selective thinning and improvement cut.

In 2019 a routine timber inventory was conducted (E. Hoyt, Forestry Intern). The data estimated the tract to be 90% stocked with 110 Sq. Ft. of total basal area per acre in 147 trees per acre containing approximately 10,416 Bd. Ft. of total sawtimber per acre.

Timber in compartment 9 tract 7 is predominantly closed canopy mixed hardwoods, with some pockets of oak-hickory, beech-maple and small pine stands. The over-story consists mostly of medium to large sawlog sized poplar, oak, hickory, maple and beech; with eastern white pine, red pine, and Virginia pine in the northern and eastern portion of the tract. The quality of merchantable timber is good with the ridge tops and upper slopes containing more of the mixed hardwoods, and the mid to lower slopes containing more of the oak-hickory. The pole-sized under-story consists mostly of maple, poplar, beech, hickory, oak, and pine. Advanced regeneration is represented mostly by beech, maple, ash, sassafras, and poplar.

The current inventory and stocking level indicates the tract is fully stocked. Some areas of the tract are sufficiently mature and crowded that resource competition is taking place and thinning may be

beneficial. Often, there is little groundcover or early successional regeneration in these areas due to low light levels and browse. In the remaining areas, the tract is still maturing but could benefit from the selective removal of less desirable species and low quality individuals in an effort to improve the overall tract quality and composition.

The recommendation is to perform an intermediate harvest in the form of a thinning and improvement cut, utilizing the single tree and group selection methods within the un-even aged management system.

A thinning should be done to reduce competition and mortality amongst the overcrowded timber. An improvement cut should be incorporated to improve the overall species composition and quality of the tract by select harvesting the low quality, damaged, diseased, dying and poorly formed trees as well as thinning of less desirable species, especially the declining yellow-poplar that are competing with the oak and other quality trees such as the hickory and cherry. In addition, ash trees susceptible to Emerald Ash Borer (EAB) will be selected for harvest to utilize their product before they become populated with the insect and decline. However, live, healthy Ash which survive or escape the intense killing wave of EAB will be retained and their growth encouraged through applied management. The two-fold objective is to recruit ash regeneration before EAB induce mortality and then promote the development of EAB survivors.

In some areas, a shelterwood-type situation may be created as trees are removed from the intermediate and understory layers while larger dominant and co-dominant trees (especially where oak is a strong component) are left standing. This will allow more diffuse sunlight to reach the ground and improve the establishment and survival of seedlings.

Hardwood group selection openings, on less than 10% of the tract may also be created to remove groups of undesirable species or poor quality individuals and to promote regeneration and early successional habitat.

In combination, these silvicultural methods will reduce stand density; improve overall growing conditions and timber quality, while encouraging tree species diversity and regeneration of native mixed hardwood species.

The long term objective with the pine stands is a transitioning over the next 2 cycles away from these non-native species and towards a native hardwood mix. This would utilize a combination of group and single tree selection systems as described above.

Management in the form of timber stand improvement (T.S.I.) is prescribed to release preferred, high quality crop trees through the culling of low volume, poorly formed trees and less desirable species, and to encourage regeneration through the creation of canopy gaps and a reduction in understory shade tolerant species. T.S.I. would also look at problem occurrences of multi-flora rose and autumn olive.

Standing dead trees (snags) and cavity trees will be given consideration for retention as habitat for wildlife. Legacy trees, as defined by the Resource Management Strategy for the Indiana Bat on State Forest Property, will be given consideration for retention as habitat for the Indiana Bat. In

addition, the girdling of select, larger diameter cull trees could be performed through T.S.I. to address the Management Guidelines for Compartment-Level Wildlife Habitat Features.

The overall goal of this prescription is to improve timber species composition, provide resources for future crop trees through the removal of over-mature and declining trees, and provide forest wildlife habitat. The overall prescribed harvest would remove approximately 25-33% of the standing volume, with an estimated volume: 203,000-270,000 board feet.

The tract is projected to remain in the fully stocked category after the prescribed elective harvest.

The existing haul road, log yard, and skid trail system will be utilized for management activities eliminating the need for any new construction. As with all forest management activities, Best Management Practice (BMP) guidelines will be followed to protect soil and water resources.

Inventory Summary

Total Number Trees/Acre: 147 **Average Tree Diameter:** 13.5"
Average Site Index: 80 Oak **Stocking Level:** 90%

	Acres		Sq.Ft./Acre
Hardwood Commercial Forest:	73	**Basal Area Sawtimber.**	81.9
Pine Commercial Forest:	5	**Basal Area Poles:**	25.2
Noncommercial Forest:	0	**Basal Area Culls:**	1.0
Permanent Openings:	0	**Sub Merch.**	1.6
Other Use:			
Total:	78	**Total Basal Area:**	109.7

Estimated Tract Volumes for Commercial Forest Area – Bd.Ft. Doyle Rule

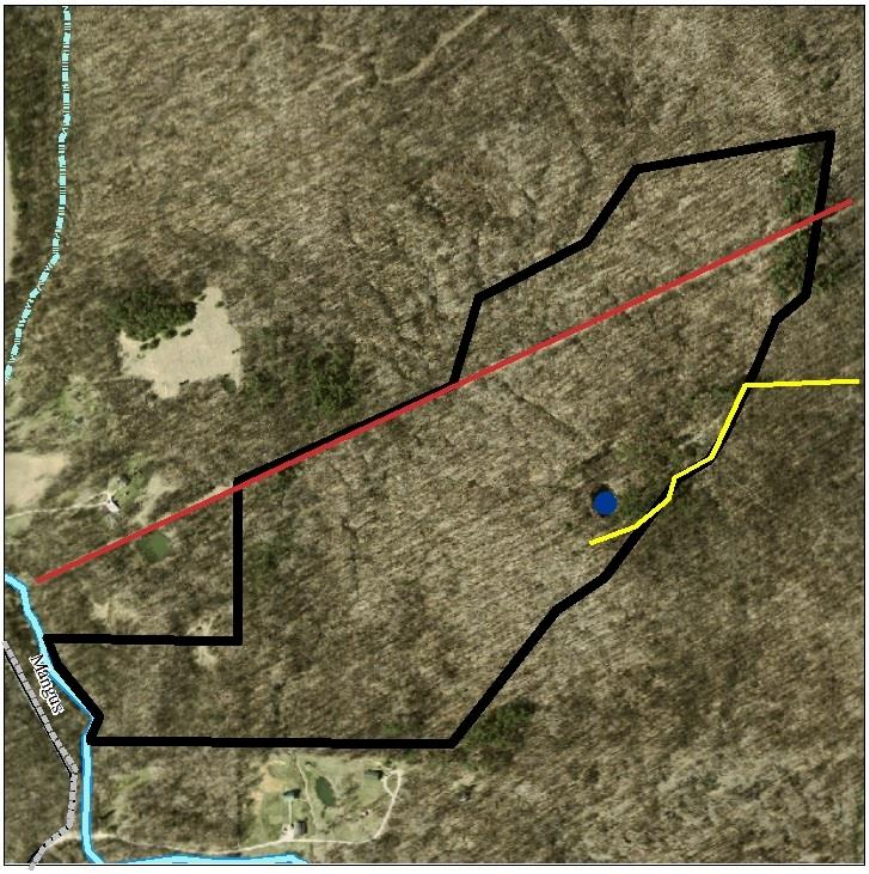
Tree Species	Total Volume Per Acre
Yellow-Poplar	2646
White Oak	1536
Red Oak	1246
Pignut Hickory	846
Sugar Maple	751
Red Maple	701
Shagbark Hickory	410
American Beech	381
E. White Pine	345
White Ash	313
American Sycamore	265

Black Cherry	208
Sassafras	198
Bitternut Hickory	174
Virginia Pine	96
Chinkapin Oak	86
Black Walnut	76
Largetooth Aspen	55
Black Oak	46
Shortleaf Pine	38
Total/Acre	10,417
Tract Total	812,432

Proposed Management Activities

2020 ---------- Address exotic/invasive species
2021-22 ------- Timber Marking and Sale Layout
2021-23 ------- Timber Sale/Harvest
2022-24 ------- Post-Harvest TSI and Exotic/Invasive Control
2024-2026----- Regeneration Opening Review
2031-2033----- Inventory

Compartment 9 Tract 7



Legend:
Tract Boundary
Pipeline
Perenial Stream
Mangus Road
Access Trail
Pond

0 325 650 1,300 Feet

1 inch = 490.333333 feet

All Boundaries Are Approximated

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W E
S